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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/116,138 07/15/98 ANTHONY

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EXAMINER

MAIL
ART UNIT

PAPER NUMBER

2814
DATE MAILED:

10/22/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/116,138

Applicant(s)

ANTHONY ET AL.

Examiner

Anh D. Mai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 0 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30, 36-40 and 46-80 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-30, 36-40 and 46-80 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-30 and 46-73, Group I, are drawn to method of making, classified in class 438, subclass 287.
 - II. Claims 36-40 and 74-80, Group II, are drawn to semiconductor device, classified in class 257, subclass 213.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions Group I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the metal or zirconium silicate layer can be made by implanting oxygen ions into metal or zirconium silicide layer then annealing in oxidizing ambient.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. This application contains claims directed to the following *patentably distinct species* of the claimed invention:

I*, claim 1, forming a field effect device on an integrated circuit comprising forming a **metal silicate dielectric layer** on the substrate.

Ia, claim 2, forming metal silicate by forming a silicide layer follow by oxidizing the silicide layer to form metal silicate.

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Ia-1, claim 3, oxidizing a portion of silicon surface prior to deposit the metal.

Ia-2, claims 4-7, simultaneously exposing the silicide to an oxidizing gas and a reducing gas.

Ia-3, claims 8 and 9, oxidizing using oxygen plasma.

Ia-4, claims 10 and 11, further annealing in non-oxidizing ambient.

Ib, claim 12, forming metal silicate by depositing metal on the substrate in oxidizing ambient then annealing in oxidizing ambient.

Ib-1, claim 13, oxidizing the substrate prior to depositing the metal.

Ib-2, claim 14, clean the Si surface prior to depositing the metal.

Ib-3, claim 15, depositing the metal by sputtering material from target.

Ic, claim 16, forming metal silicate by depositing metal and silicon on the substrate in oxidizing ambient then annealing in oxidizing ambient.

Ic-1, claim 17, oxidizing the substrate prior to depositing the metal and silicon .

Ic-2, claim 18, clean the Si surface prior to depositing the metal oxide and silicon.

Ic-3, claim 19, depositing metal and silicon simultaneously.

Ic-3-1, claim 20, by sputtering material from a target.

Ic-3-2, claim 21, by evaporating metal and silicon from common source.

Ic-3-3, claims 22 and 23, by evaporating metal and silicon from separate sources.

Id, claims 24 and 25, forming metal silicate by repeating steps of forming an intermediate layer of material (1nm) then annealing in an oxidizing ambient.

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Ie, claim 26, forming metal silicate by exposing a clean Si surface then depositing a partially reduced metal silicate layer on the Si surface.

Ie-1, claim 27, further annealing the partially reduced metal silicate in oxygen.

Ie-1-1, claim 28, depositing the partially reduced metal silicate by simultaneously PVD of metal oxide and silicon.

Ie-1-2, claim 29, depositing the partially reduced metal silicate by simultaneously PVD of zirconium oxide and silicon.

Ie-1-3, claim 30, depositing the partially reduced metal silicate by simultaneously PVD of hafnium oxide and silicon.

I**, claim 46, forming a field effect device on an integrated circuit comprising forming a **zirconium silicate dielectric layer** on the substrate.

If, claim 47, forming metal silicate by forming a zirconium silicide layer follow by oxidizing the zirconium silicide layer to form zirconium silicate dielectric layer.

If-1, claim 48, oxidizing a portion of silicon surface prior to deposit the zirconium.

If-2, claims 49-52, simultaneously exposing the zirconium silicide to an oxidizing gas and a reducing gas.

If-3, claims 53 and 54, oxidizing using oxygen plasma.

If-4, claims 55 and 56, further annealing in non-oxidizing ambient.

Ig, claim 57, forming zirconium silicate by depositing zirconium on the substrate in oxidizing ambient then annealing in oxidizing ambient.

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Ig-1, claim 58, oxidizing the substrate prior to depositing the zirconium.

Ig-2, claim 59, clean the Si surface prior to depositing the zirconium.

Ig-3, claim 60, depositing the zirconium by sputtering material from a zirconium target.

Ih, claim 61, forming zirconium silicate by depositing zirconium and silicon on the substrate in oxidizing ambient then annealing in oxidizing ambient.

Ih-1, claim 62, oxidizing the substrate prior to depositing step.

Ih-2, claim 63, clean the Si surface prior to depositing step.

Ih-3, claim 64, depositing zirconium and silicon simultaneously.

Ih-3-1, claim 65, by sputtering material from a zirconium and silicon target.

Ih-3-2, claim 66, by evaporating zirconium and silicon from common source.

Ih-3-3, claims 67 and 68, by evaporating zirconium and silicon from separate sources.

Ii, claims 69 and 70, forming zirconium silicate by repeating steps of forming an intermediate layer of material (1nm) then annealing in an oxidizing ambient.

Ij, claims 71-73, forming zirconium silicate by exposing a clean Si surface then depositing a partially reduced zirconium silicate layer on the Si surface.

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Applicant is required under 35 U.S.C. 121 to elect **a single disclosed species** for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there is no generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant *traverse* on the ground that the species *are not patentably distinct*, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

5. Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the

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currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (703) 305-0575. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A.M
October 10, 2001


OLIK CHAUDHURI
SUPERVISORY PATENT EXAMINER
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